June 1994

Paper 2

1- (a) $280 + 50 = 330$

(b) $330 - 220 = 110$

2- $\frac{500}{530} \times 100 = 94.3\ \%$

3- $\frac{5}{9} \times 225 = \$\ 125$

$\frac{4}{9} \times 225 = \$\ 100$

4- $\frac{1}{f} = \frac{1}{\left(\frac{1}{4}\right)} + \frac{1}{\left(\frac{2}{3}\right)}$

$\frac{1}{f} = 4 + \frac{3}{2} = \frac{11}{2}$

$f = \frac{2}{11}$

5-

	1980	increase	1990	
percent	100	140	240	$\frac{180 \times 100}{240} = 75$
actual	?		180	

answer = $ 75

6- 57 hours = 2 x 24 + 9

i.e. two days and 9 hours

Fri. 16.30	Sat. 17.30	Sun. 17.30
7/2	8/2	9/2 + 9 hours
		26.30
		− 24
		2.30 next day

Answer : Time : 2.30 Day : Monday Date : 10th Feb.

7- $\frac{\text{Larger capacity}}{\text{Smaller capacity}} = \left(\frac{12}{7}\right)^3$

$\frac{x}{300} = \left(\frac{12}{7}\right)^3$

$x = 300 \times \left(\frac{12}{7}\right)^3 = 1511$ Answer : 1510 ml

8- (a) $149.5 < 150 < 150.5$ and $39.5 < 40 < 40.5$

Least possible distance = 149.5 + 39.5 = 189 km

(b) $145 < 150 < 155$ $35 < 40 < 45$

Least possible distance = 145 + 35 = 180 km

9- (a) $(8 - 5) \times 3 = 9$,

(b) $8 - (5 \times 3) = -7$.

10- $\mathcal{E}$ = {x $2 \le x \le 12$ and x is an integer}. A = {prime numbers}. and B = {factors of 12}

$\mathcal{E}$ = {2 3 4 5 6 7 8 9 10 11 12}. A = {2 3 5 7 11} B = {2, 3, 4, 6, 12}

A' = {4, 6, 8, 10, 12}

(a) (i) $A \cap B = \{2, 3\}$ (ii) $\{2, 3, 4, 5, 6, 7, 11, 12\}$

(b) $n(A') = 6$

11- $p + 2q = 1$ $\quad x - 3$

$3p + 4q = 0$

$-3p - 6q = -3$

$-2q = -3$

$q = \frac{-3}{-2} = \frac{3}{2} = 1\frac{1}{2}$

$p + 2 \times \frac{3}{2} = 1$

$p + 3 = 1$

$p = 1 - 3$

$p = -2$

12- (a) $= \frac{1}{3} \times 12 \times 12 \times 9.5$

$= 456 \text{ cm}^3$

(b) $= 4$

13- $2x(x^2 - 4y^2)$

$2x(x + 2y)(x - 2y)$

14- (a) 1

(b) $4x^6$

15- $I = \frac{K}{R}$

$6 = \frac{K}{2}$

$\therefore K = 12 \qquad I = \frac{12}{R}$

$= \frac{12}{1} = 24$

2

16- $\frac{620}{3.14} = 197.452$

$197.452 - 192$

$= £\ 5.45$

17- $-5 \le x \le -3$ and $-1 \le y \le 2$.

$x = \{-5, -4, -3\}, \quad y = \{-1, 0, 1, 2\}$

(a) $x + y = -3 + 2 = -1$

(b) $xy = -5 \times -1 = 5$

(c) $x^2 y = (-5)^2 \times 2 = 50$

18- (a) $\frac{2}{x} - \frac{1}{x+1} = \frac{2(x+1)-x}{x(x+1)}$

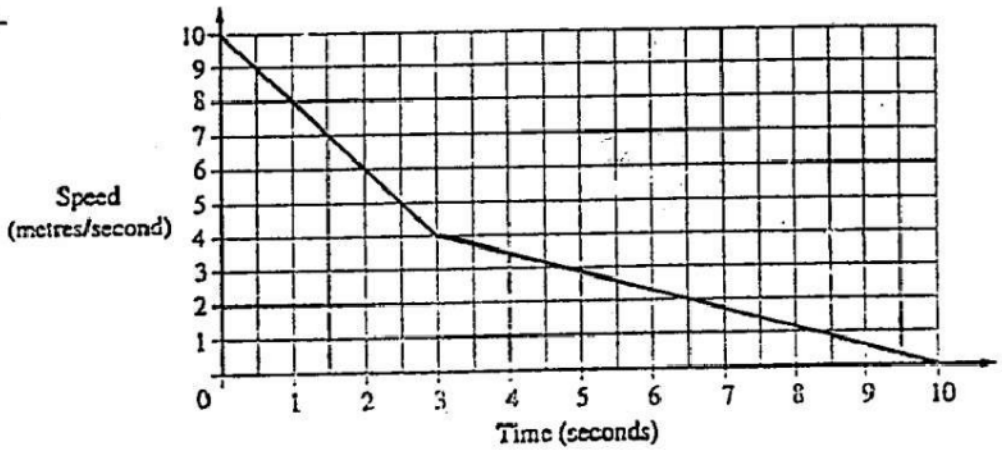
$= \frac{2x+2-x}{x(x+1)} = \frac{x+2}{x(x+1)}$

(b) $\frac{x+2}{x(x+1)} = 0$

$x + 2 = 0$

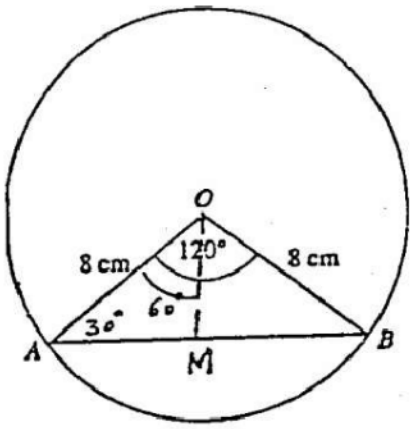
$x = -2$

19-



(a) $\frac{10-4}{3} = 2 \text{ m/s}^2$

(b) $\frac{6x3}{2} + 4x3 + \frac{7x4}{2} = 35 \text{ m}$



NOT TO SCALE

20- (a) AM = 8 sin 60

or 8 cos 30

AB = 2 x 8 cos 30

= 16 cos 30

= 13.9 cm

(b) $\frac{120}{360}$ x 2 x 3.142 x 8 = 16.8 cm

21- (a) $BA = \begin{pmatrix} -3 & 2 \end{pmatrix} \begin{pmatrix} 3 & 1 \\ 0 & -2 \end{pmatrix} = (-9 \quad -7)$

(b) $A^{-1} = \frac{1}{-6} \begin{pmatrix} -2 & -1 \\ 0 & 3 \end{pmatrix} = \begin{pmatrix} \frac{1}{3} & \frac{1}{6} \\ 0 & -\frac{1}{2} \end{pmatrix}$

22- (a) $\overrightarrow{OM} = \overline{OQ} + \overline{QM}$

$= q + \frac{1}{2}(\overline{QP})$

$= q + \frac{1}{2}(-q + P)$

$= q - \frac{1}{2}q + \frac{1}{2}P$

$= \frac{1}{2}P + \frac{1}{2}q$

(b) $\overline{NQ} + \overline{QM}$

$= \frac{1}{4}q + \frac{1}{2}(-q + P)$

$= \frac{1}{4}q - \frac{1}{2}q + \frac{1}{2}P = \frac{1}{2}p - \frac{1}{4}q$

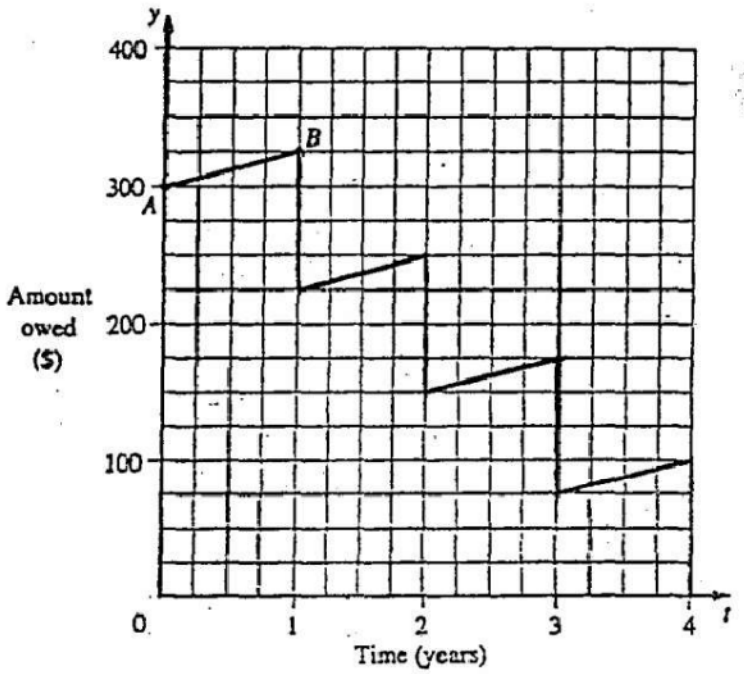
$\overline{NM} = \frac{1}{2}P - \frac{1}{4}q$

23- (a) Shear in the x – direction, scalefactor 2

x – axis invariant

(b) Stretch parallel to the y – axis scale factor 2

24-



(a) $ 162 ½

(b) $ 100

(c) 100 x 4 – 300 = $ 100

(d) C = 300

intersection with y axis

when t = 1 y = 325

∴ 325 = m + 300

m = 25

Nov. 1994

Paper 2

1. Time of arrival = 23 40 + 7 30 − 5
   = 26 10 − 24
   = 02 10 (next day)

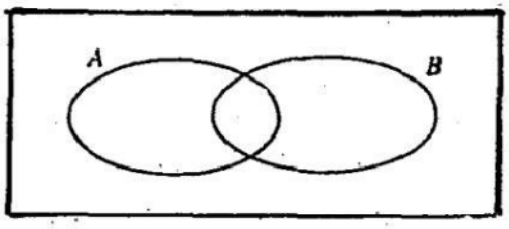
2. | Original | reduction | sale price |
   |---|---|---|
   | 100 | 15 | 85 |
   | ? | | 27.20 |

   Cost before the sale $= \frac{100 \times 27.20}{85} = \$\ 32$

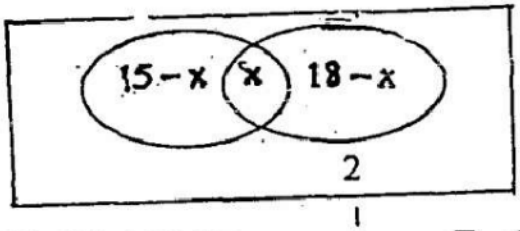
3. $\sin 18° = \frac{BC}{280}$

   $BC = 280 \times \sin 18 = 86.5$ m

4. (a)



   (b)

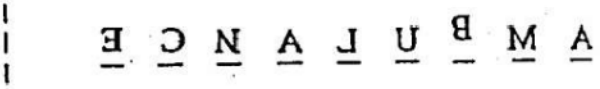


$15 - x + x + 18 - x + 2 = 30$

$x = 5$

number of students studying both Art and Biology = 5

5. AMBULANCE



6. (a) 13.50 x 3.90 = 52.92 Ryals
   (b) 400 ÷ 3.90 = $ 102.04

7. $\frac{x+9}{3} - \frac{x-11}{4} = \frac{4(x+9)-3(x-11)}{12}$

$= \frac{4x+36-3x+33}{12} = \frac{x+69}{12}$

8. (a) Angle DEF = 130°

(b) Sum of interior angles = $(2x6 - 4)x90 = 720$

Angle BCD = $\frac{720-(2x130+2x120)}{2} = 110$

OR Angle BCD = $(180 - 130) + (180 - 120) = 50 + 60 = 110$

9. (a) $\sqrt{250}$ (b) 25 (c) 29

10. (a) $\frac{3}{5} = 0.6$, $\frac{7}{12} = 0.583$, $\frac{17}{30} = 0.567$

$$\frac{17}{30} < \frac{7}{12} < \frac{3}{5}$$

(b) $\frac{215}{360} = 0.597$

closest estimate is 0.6 i.e. $\frac{3}{5}$

11. (a) $40\,000 \times 10^6 \times \frac{2}{1000} = 8.00 \times 10^7$ kg

(b) $\frac{8 \times 10^7}{1000} = 8 \times 10^4 = 80\,000$ hectares

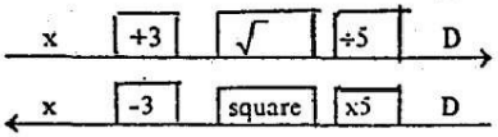
12. $D = \frac{\sqrt{x+3}}{5}$

$D^2 = \frac{x+3}{25}$

$x + 3 = 25D^2$

$x = 25D^2 - 3$

OR



$x = (5D)^2 - 3 = 25D^2 - 3$

13. Least speed = $\frac{860-50}{3x60} = \frac{810}{180} = 4.5$ m/s

14. Capacity of the model $= \frac{10000}{(50)^3}$ Litres

$= 0.08 \times 1000 = 80$ mL

15. (a) (i) angle OBD $= 180 - 130 = 50°$

(ii) angle OAC $= \frac{130}{2} = 65°$

(iii) angle BDC $= \frac{360-130}{2} = 115°$

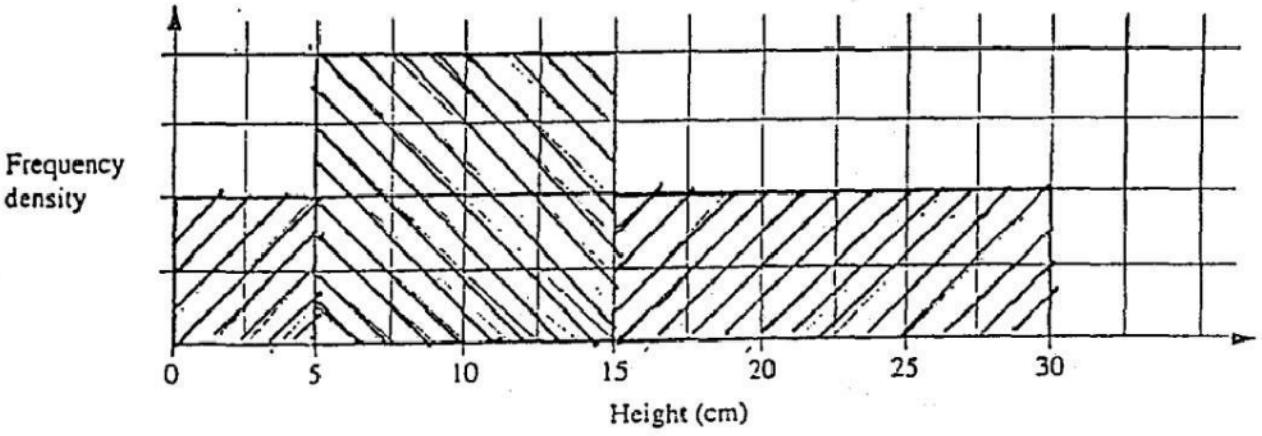
(b) $< OBD + < BDC = 50 + 115 = 165$

As the sum is not equal 180°, therefore AB is not parallel to CD .

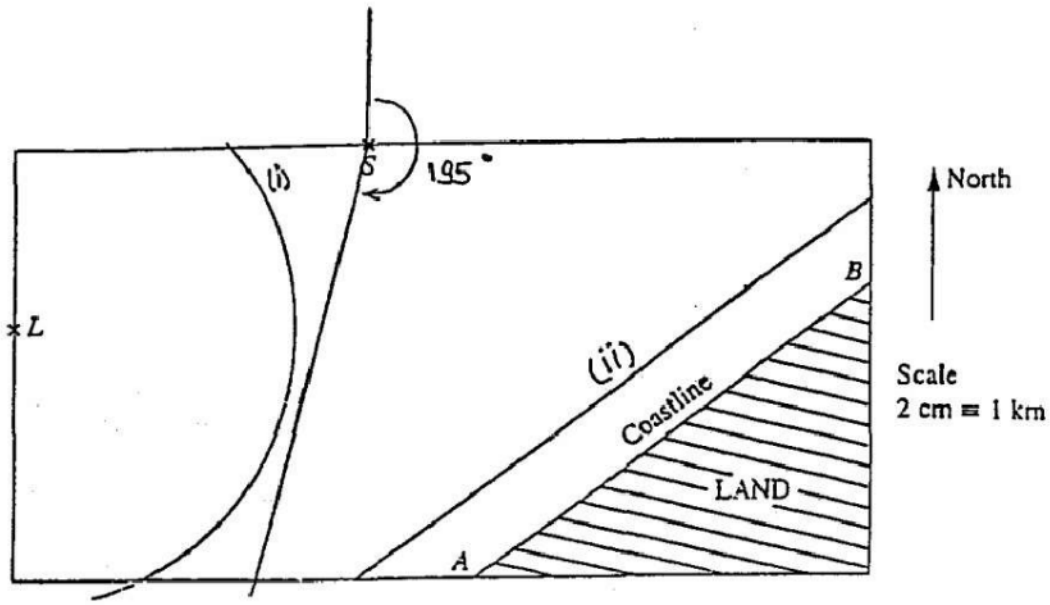
16. (a) $\frac{15}{5+20+15} \times 360° = \frac{15}{40} \times 360 = 135°$

(b)

Height & width	$0 < h \leq 5$ 5	$5 < h \leq 15$ $15 - 5 = 10$	$15 < h \leq 30$ $30 - 15 = 15$
Frequency	5	20	15
Frequency density	$\frac{5}{5} = 1$	$\frac{20}{10} = 1$	$\frac{15}{15} = 1$



17. (a)



(b) (ii) Yes.

18. (a) $f(x) = 7$

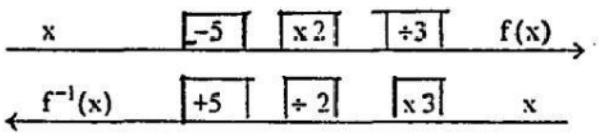
$$\frac{2(x-5)}{3} = 7$$

$$2x - 10 = 3 \times 7 = 21$$

$$2x = 21 + 10 = 31$$

$$x = \frac{31}{2} = 15.5$$

(b) $f^{-1}(x)$



$$f^{-1}(x) = \frac{3x}{2} + 5 = \frac{3x + 10}{2}$$

$$\underline{OR} \quad y = \frac{2(x-5)}{3}$$

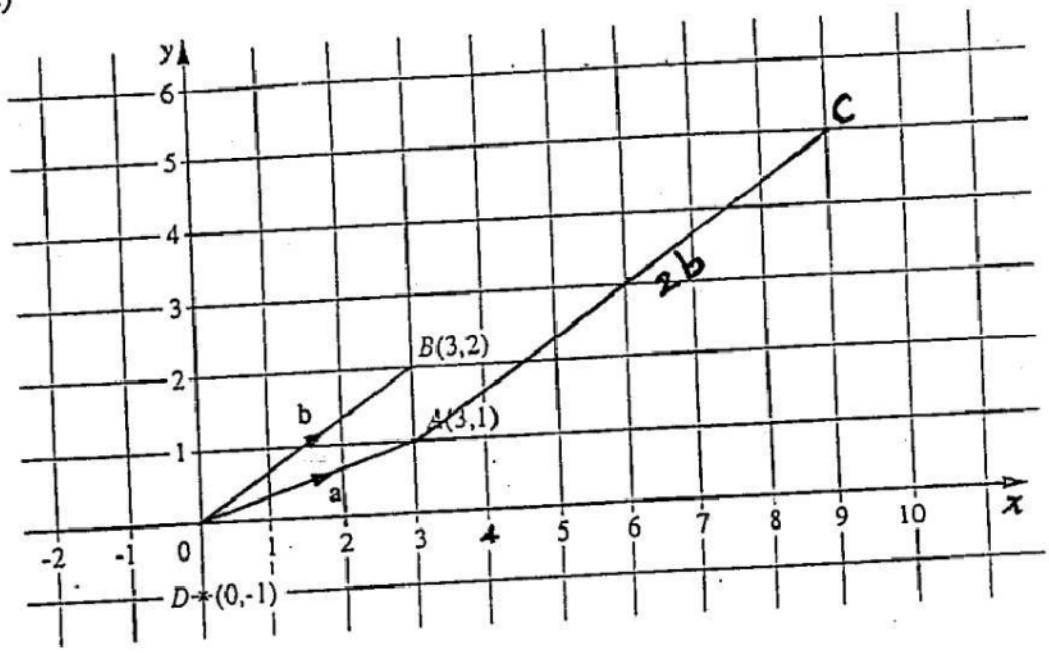
$$3y = 2x - 10$$

$$2x = 3y + 10$$

$$x = \frac{3y+10}{2}$$

$$f^{-1}(x) = \frac{3x+10}{2}$$

19. (a)



(b) $\overrightarrow{OD} = \overrightarrow{BA} = a - b$

(c) $|a| = \sqrt{3^2 + 1^2} = \sqrt{10} = 3.16$

20. (a) total surface area to be painted

$= (30 + 20) \times 2 \times 4 + 30 \times 20 - 200$

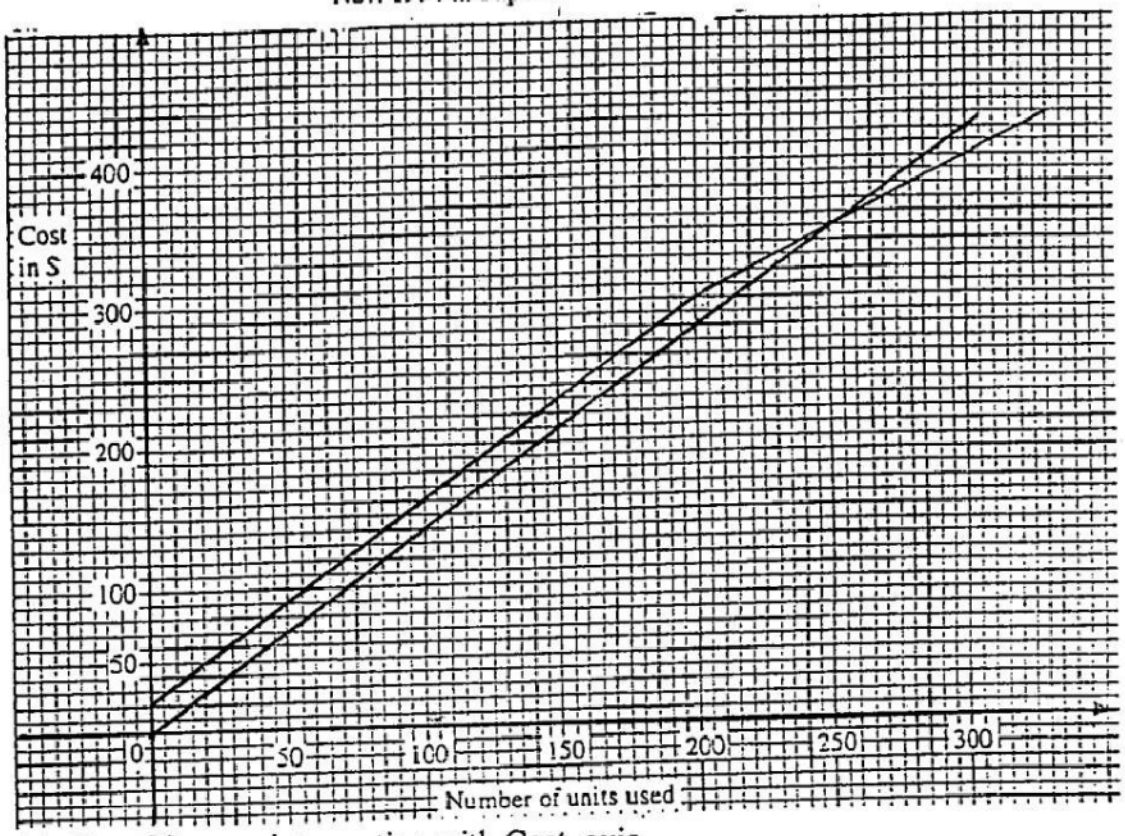
$= 400 + 600 - 200 = 800\ m^2$

(b) Number of Litres $= \frac{800}{18} = 44.44$

Nuber of tins $= \frac{44.44}{5} = 8.89$

Number of tins required $= 9$

21.



(a) C = 20 intersection with Cost axis

$$m = \frac{300-20}{200} = \frac{280}{200} = 1.4 \qquad \text{(gradient)}$$

(b) for 100 units cost is $ 140
for 200 units cost is $ 280
then join the points with the origin as shown above.

(c) point of intersection of the two lines at 250 units.

22. (a) $\text{acceleration} = \dfrac{\text{change in velocity}}{\text{time}} = \dfrac{20}{20} = 1 \text{m/s}^2$

(b) distance = area under the line (from $t = 50$ to $t = 60$)
= ½ x 10 x 20 = 100 m

(c) total distance = total area of trapezium = $\dfrac{30+60}{2} \times 20 = 900$ m

(d) Average speed = $\dfrac{900}{60}$ = 15 m/s